

In the Claims:

Please amend claims 1-5, 30-32, and 40-48. The claims are as follows:

1. (Currently amended) A method for modeling a characteristic C that is distributed within a domain, said method comprising:

providing storing a base equation in at least one computer-readable memory device, said base equation expressing the characteristic C as a function f of a variable V through use of N+1 parameters C_0, C_1, \dots, C_N , said base equation being of the a form $C = f(C_0, C_1, \dots, C_N, V)$, said N being at least 1, said parameters C_0, C_1, \dots, C_N being subject to uncertainty;

providing generating a probability density function (PDF) for describing the a probability of occurrence of C_0 in accordance with said uncertainty; and

providing generating subsidiary equations expressing C_1, \dots, C_N in terms of C_0 ; and storing the PDF and the subsidiary equations in the at least one computer-readable memory device, wherein the base equation, the PDF, and the subsidiary equations are adapted to be accessed from the at least one memory device for usage in determining C.

2. (Currently amended) The method of claim 1, wherein $C = C_0$ if $V = V_0$, and wherein providing generating the PDF comprises:

providing test data of $C = C_0(k)$ at each node k of K nodes in a space such that $V = V_0$ at node k, said $C_0(k)$ being C_0 at node k, said K being at least 2, said k being an integer having values 1, 2, ..., K; and

deriving generating said PDF from said test data.

3. (Currently amended) The method of claim 1, wherein providing generating the subsidiary equations comprise:

providing test data of $C(k)$ versus V at each node k of K nodes in a space, said $C(k)$ being C at node k , said K being at least 2, said k being an integer having values 1, 2, ..., K ;

fitting the function f to the test data at each node k of the K nodes to obtain $C(k) = f(C_0(k), C_1(k), \dots, C_N(k), V)$, said $C_0(k), C_1(k), \dots, C_N(k)$ respectively denoting C_0, C_1, \dots, C_N at node k ; and

deriving generating the subsidiary equations by utilizing $C(k) = f(C_0(k), C_1(k), \dots, C_N(k), V)$ at each node k of the K nodes.

4. (Currently amended) The method of claim 1, wherein the method further ~~comprising~~ comprises:

providing a value V' of V ;

picking a random value C_{0R} of C_0 from the PDF;

computing values C_{1R}, \dots, C_{NR} of C_1, \dots, C_N , respectively, by substituting C_{0R} into the subsidiary equations; ~~and~~

calculating a value of C by substituting $C_{0R}, C_{1R}, \dots, C_{NR}$ and V' into the base equation; and

outputting the calculated value of C to an output device.

5. (Currently amended) The method of claim 1, wherein the method further ~~comprising~~ comprises determining a performance characteristic of a design, said design comprising I nodes

in the domain, said I being at least 2, each node i of the I nodes having a value C(i) of the characteristic C, said i having values of 1, 2, ..., I, said determining a performance characteristic comprising:

randomly selecting a value of C(i) of C at each node i of the I nodes; and

determining the performance characteristic, including utilizing said randomly selected

C(1), C(2), ..., C(I); and

outputting the determined performance characteristic to an output device.

6. (Original) The method of claim 5, said randomly selecting a value of C(i) comprising:

providing a value V(i) of V at node i;

picking a random value C_{0R} of C_0 from the PDF;

calculating corresponding values C_{1R} , ..., C_{NR} of C_1 , ..., C_N , respectively, by substituting

C_{0R} into the subsidiary equations; and

computing C(i) by substituting C_{0R} , C_{1R} , ..., C_{NR} and V(i) into the base equation.

7. (Original) The method of claim 1, said PDF being a normal probability distribution.

8. (Original) The method of claim 1, said subsidiary equations having a form of $C_x = g_x(C_{x-1})$ for functions g_x , said functions g_x each being a linear or quadratic function of C_{x-1} , said x having values of 1, 2, ..., N.

9. (Original) The method of claim 1, said domain being a physical domain, said characteristic C being spatially distributed within said physical domain.

10. (Original) The method of claim 1, said characteristic C being an electrical characteristic.

11. (Original) The method of claim 10, said characteristic C denoting capacitance at a node of the domain, said V denoting a voltage applied to the node.

12. (Original) The method of claim 11, said function f being a polynomial in V of order N, said N being at least 5.

13. (Original) The method of claim 12, said $N=2$, said function f being $C_0/(1-V/V_B)^m$, said $C_1=V_B$, said $C_2=m$.

14. (Withdrawn) A method for modeling a characteristic C that is distributed within a domain, said characteristic C having J subcharacteristics S_1, S_2, \dots, S_J , said method comprising:

providing a combination equation that expresses C as a function F of the J subcharacteristics, said J being at least 2;

providing base equations expressing S_j as a function f_j of a variable V through use of $N+1$ parameters $S_{j0}, S_{j1}, \dots, S_{jN}$, said base equations being of the form $S_j = f_j(S_{j0}, S_{j1}, \dots, S_{jN}, V)$, said N being at least 1, said parameters $S_{j0}, S_{j1}, \dots, S_{jN}$ being subject to uncertainty, said j having values of 1, 2, ..., J;

providing at least one probability density function (PDF) from $PDF_1, PDF_2, \dots, PDF_J$, said PDF_n describing the probability of occurrence of S_{n0} in accordance with said uncertainty for $n=1, 2, \dots, J$, said at least one PDF including PDF_1 ;

for each PDF_n not provided: providing an auxiliary equation E_n expressing S_{n0} in terms of S_{10} ; and

providing subsidiary equations expressing S_{j1}, \dots, S_{jN} in terms of S_{j0} for each subcharacteristic S_j of the J subcharacteristics.

15. (Withdrawn) The method of claim 14, wherein $S_j = S_{j0}$ if $V = V_0$ for each subcharacteristic S_j of the J subcharacteristics, and wherein providing the PDF_n for the at least one n comprises:

providing test data from which $S_{n0}(k)$ may be inferred at each node k of K nodes in a space such that $V = V_0$ at node k , said $S_{n0}(k)$ being S_{n0} at node k , said K being at least 2, said k having values of 1, 2, ..., K ; and

deriving said PDF_n from said test data.

16. (Withdrawn) The method of claim 14, wherein providing the subsidiary equations comprise for each subcharacteristic S_j of the J subcharacteristics:

providing test data from which $S_j(k)$ versus V may be inferred at each node k of K nodes in a space, said $S_j(k)$ being S_j at node k , said K being at least 2, said k having values of 1, 2, ..., K ;

fitting the function f_j to the test data at each node k of the K nodes to obtain $S_j(k) = f(S_{j0}(k), S_{j1}(k), \dots, S_{jN}(k), V)$, said $S_{j0}(k), S_{j1}(k), \dots, S_{jN}(k)$ respectively denoting $S_{j0}, S_{j1}, \dots, S_{jN}$ at

each node k ; and

deriving the subsidiary equations by utilizing $S_j(k) = f(S_{j0}(k), S_{j1}(k), \dots, S_{jN}(k), V)$ for each node k of the K nodes.

17. (Withdrawn) The method of claim 14, further comprising:

providing a value V' of V ;

for each PDF_n provided: picking a random value of S_{n0R} from PDF_n ;

for PDF_n not provided: calculating S_{n0R} by substituting S_{10R} into the auxiliary equation E_n ;

computing values S_{j1R}, \dots, S_{jNR} of S_{j1}, \dots, S_{jN} , respectively, by substituting S_{j0R} into the subsidiary equations for each subcharacteristic S_j of the J subcharacteristics;

calculating S_j by substituting $S_{j0R}, S_{j1R}, \dots, S_{jNR}$ and V' into the base equations $S_j = f_j(S_{j0}, S_{j1}, \dots, S_{jN}, V)$ for each subcharacteristic S_j of the J subcharacteristics; and

computing C by substituting S_1, S_2, \dots, S_J into the combination equation.

18. (Withdrawn) The method of claim 14, further comprising determining a performance characteristic of a design, said design comprising I nodes in the domain, said I being at least 2, each node of the I nodes having the characteristic C comprising the J subcharacteristics S_1, S_2, \dots, S_J , said I having values of 1, 2, ..., I , said determining a performance characteristic comprising:

randomly selecting a value $C(i)$ of C at each node i of the I nodes, including:

randomly selecting a value $S_j(i)$ of S_j at node i for each subcharacteristic S_j of the J subcharacteristics and computing $C(i)$ by substituting $S_1(i), S_2(i), \dots, S_J(i)$ into the combination equation for each node i ; and

determining said performance characteristic, including utilizing said randomly selected $C(1), C(2), \dots, C(I)$.

19. (Withdrawn) The method of claim 18, said randomly selecting $S_j(i)$ at node i for each subcharacteristic S_j of the J subcharacteristics comprising:

providing a value $V(i)$ of V at node i ;

for each n such that PDF_n is provided for: picking a random value of S_{n0R} from PDF_j ;

for each n such that PDF_n is not provided for: calculating S_{n0R} by substituting S_{10R} into the auxiliary equation E_n ;

calculating corresponding values S_{j1R}, \dots, S_{jNR} of S_{j1}, \dots, S_{jN} , respectively, by substituting S_{j0R} into the subsidiary equations; and

calculating $S_j(i)$ by substituting $S_{j0R}, S_{j1R}, \dots, S_{jNR}$ and $V(i)$ into the base equation of S_j .

20. (Withdrawn) The method of claim 14, said method further comprising for $n=2, \dots, J$:

determining whether S_{n0} is sufficiently correlated with S_{10} , wherein if said determining determines that S_{n0} is not sufficiently correlated with S_{10} then providing said PDF_n , but if said determining determines that S_{n0} is sufficiently correlated with S_{10} then not providing said PDF_n and instead deriving said auxiliary equation E_n from scatter data of S_{n0} versus S_{10} .

21. (Withdrawn) The method of claim 20, wherein said determining whether S_{n0} is sufficiently correlated with S_{10} comprises computing a correlation parameter R_n from said scatter data of S_{n0} versus S_{10} , said correlation parameter R_n being a square of a correlation coefficient r_n between S_{n0}

and S_{10} , and wherein S_{n0} is sufficiently correlated with S_{10} if R_n is no less than a specified minimum correlation parameter R_{MIN} .

22. (Withdrawn) The method of claim 14, said f_j having a same functional form of V for each subcharacteristic S_j of the J subcharacteristics.

23. (Withdrawn) The method of claim 14, said f_j being constant with respect to any variation in V for each subcharacteristic S_j of the J subcharacteristics.

24. (Withdrawn) The method of claim 14, said f_j varying with respect to a variation in V for each subcharacteristic S_j of the J subcharacteristics.

25. (Withdrawn) The method of claim 14, said PDF_j being a normal probability distribution for at least one subcharacteristic S_j of the J subcharacteristics.

26. (Withdrawn) The method of claim 14, said domain being a physical domain, said characteristic C being spatially distributed within said physical domain.

27. (Withdrawn) The method of claim 14, said characteristic C being an electrical characteristic.

28. (Withdrawn) The method of claim 27, said characteristic C denoting capacitance at a node of the domain, said V denoting a voltage applied to the node.

29. (Withdrawn) The method of claim 28, said function f_j being a polynomial in V of order N for each subcharacteristic S_j of the J subcharacteristics, said N being at least 5.

30. (Currently amended) A computer program product, comprising a computer usable medium having a computer readable program code embodied therein, said computer readable program code adapted to be executed on a processor for implementing a method for modeling a characteristic C that is distributed within a domain, said method comprising:

providing storing a base equation in at least one computer-readable memory device, said base equation expressing the characteristic C as a function f of a variable V through use of $N+1$ parameters C_0, C_1, \dots, C_N , said base equation being of the a form $C = f(C_0, C_1, \dots, C_N, V)$, said N being at least 1, said parameters C_0, C_1, \dots, C_N being subject to uncertainty;

providing generating a probability density function (PDF) for describing the a probability of occurrence of C_0 in accordance with said uncertainty; and

providing generating subsidiary equations expressing C_1, \dots, C_N in terms of C_0 ; and
storing the PDF and the subsidiary equations in the at least one computer-readable memory device, wherein the base equation, the PDF, and the subsidiary equations are adapted to be accessed from the at least computer-readable one memory device for usage in determining C .

31. (Currently amended) The computer program product of claim 30, wherein the method further comprising comprises:

providing a value V' of V ;

picking a random value C_{0R} of C_0 from the PDF;

computing values C_{1R}, \dots, C_{NR} of C_1, \dots, C_N , respectively, by substituting C_{0R} into the subsidiary equations; and

calculating a value of C by substituting $C_{0R}, C_{1R}, \dots, C_{NR}$ and V' into the base equation;
and

outputting the calculated value of C to an output device.

32. (Currently amended) The computer program product of claim 30, wherein the method further comprising comprises determining a performance characteristic of a design, said design comprising I nodes in the domain, said I being at least 2, each node i of the I nodes having a value $C(i)$ of the characteristic C , said i having values of 1, 2, ..., I , said determining a performance characteristic comprising:

randomly selecting a value of $C(i)$ of C at each node i of the I nodes; and

determining the performance characteristic, including utilizing said randomly selected $C(1), C(2), \dots, C(I)$; and

outputting the determined performance characteristic to an output device.

33. (Original) The computer program product of claim 32, said randomly selecting a value of $C(i)$ comprising:

providing a value $V(i)$ of V at node i ;

picking a random value C_{0R} of C_0 from the PDF;

calculating corresponding values C_{1R}, \dots, C_{NR} of C_1, \dots, C_N , respectively, by substituting C_{0R} into the subsidiary equations; and

computing $C(i)$ by substituting C_{0R} , C_{1R} , ..., C_{NR} and $V(i)$ into the base equation.

34. (Withdrawn) A computer program product, comprising a computer usable medium having a computer readable program code embodied therein, said computer readable program code adapted to be executed on a processor for implementing a method for modeling a characteristic C that is distributed within a domain, said characteristic C having J subcharacteristics S_1, S_2, \dots, S_J , said method comprising:

providing a combination equation that expresses C as a function F of the J subcharacteristics, said J being at least 2;

providing base equations expressing S_j as a function f_j of a variable V through use of $N+1$ parameters $S_{j0}, S_{j1}, \dots, S_{jN}$, said base equations being of the form $S_j = f_j(S_{j0}, S_{j1}, \dots, S_{jN}, V)$, said N being at least 1, said parameters $S_{j0}, S_{j1}, \dots, S_{jN}$ being subject to uncertainty, said j having values of 1, 2, ..., J ;

providing at least one probability density function (PDF) from $PDF_1, PDF_2, \dots, PDF_J$, said PDF_n describing the probability of occurrence of S_{n0} in accordance with said uncertainty for $n=1, 2, \dots, J$, said at least one PDF including PDF_1 ;

for each PDF_n not provided: providing an auxiliary equation E_n expressing S_{n0} in terms of S_{10} ; and

providing subsidiary equations expressing S_{j1}, \dots, S_{jN} in terms of S_{j0} for each subcharacteristic S_j of the J subcharacteristics.

35. (Withdrawn) The computer program product of claim 34, further comprising:

providing a value V' of V ;
 for each PDF_n provided: picking a random value of S_{n0R} from PDF_n ;
 for PDF_n not provided: calculating S_{n0R} by substituting S_{10R} into the auxiliary equation E_n ;
 computing values S_{j1R}, \dots, S_{jNR} of S_{j1}, \dots, S_{jN} , respectively, by substituting S_{j0R} into the subsidiary equations for each subcharacteristic S_j of the J subcharacteristics;
 calculating S_j by substituting $S_{j0R}, S_{j1R}, \dots, S_{jNR}$ and V' into the base equations $S_j = f_j(S_{j0}, S_{j1}, \dots, S_{jN}, V)$ for each subcharacteristic S_j of the J subcharacteristics; and
 computing C by substituting S_1, S_2, \dots, S_J into the combination equation.

36. (Withdrawn) The computer program product of claim 34, further comprising determining a performance characteristic of a design, said design comprising I nodes in the domain, said I being at least 2, each node of the I nodes having the characteristic C comprising the J subcharacteristics S_1, S_2, \dots, S_J , said I having values of 1, 2, ..., I , said determining a performance characteristic comprising:

randomly selecting a value $C(i)$ of C at each node i of the I nodes, including:
 randomly selecting a value $S_j(i)$ of S_j at node i for each subcharacteristic S_j of the J subcharacteristics and computing $C(i)$ by substituting $S_1(i), S_2(i), \dots, S_J(i)$ into the combination equation for each node i and
 determining said performance characteristic, including utilizing said randomly selected $C(1), C(2), \dots, C(I)$.

37. (Withdrawn) The computer program product of claim 36, said randomly selecting $S_j(i)$ at node i for each subcharacteristic S_j of the J subcharacteristics comprising:

providing a value $V(i)$ of V at node i ;

for each n such that PDF_n is provided for: picking a random value of S_{n0R} from PDF_j ;

for each n such that PDF_n is not provided for: calculating S_{n0R} by substituting S_{10R} into the auxiliary equation E_n ;

calculating corresponding values S_{j1R}, \dots, S_{jNR} of S_{j1}, \dots, S_{jN} , respectively, by substituting S_{j0R} into the subsidiary equations; and

calculating $S_j(i)$ by substituting $S_{j0R}, S_{j1R}, \dots, S_{jNR}$ and $V(i)$ into the base equation of S_j .

38. (Withdrawn) The computer program product of claim 34, said method further comprising for $n=2, \dots, J$: determining whether S_{n0} is sufficiently correlated with S_{10} , wherein if said determining determines that S_{n0} is not sufficiently correlated with S_{10} then providing said PDF_n , but if said determining determines that S_{n0} is sufficiently correlated with S_{10} then not providing said PDF_n and instead deriving said auxiliary equation E_n from scatter data of S_{n0} versus S_{10} .

39. (Withdrawn) The computer program product of claim 38, wherein said determining whether S_{n0} is sufficiently correlated with S_{10} comprises computing a correlation parameter R_n from said scatter data of S_{n0} versus S_{10} , said correlation parameter R_n being a square of a correlation coefficient r_n between S_{n0} and S_{10} , and wherein S_{n0} is sufficiently correlated with S_{10} if R_n is no less than a specified minimum correlation parameter R_{MIN} .

40. (Currently amended) A computer readable medium comprising a model therein, said model configured to be used by a computer readable program code adapted to be executed on a processor for implementing a method that uses the model for modeling a characteristic C that is distributed within a domain, said model[[,]] comprising:

a base equation expressing a characteristic C as a function f of a variable V through use of N+1 parameters C_0, C_1, \dots, C_N , said base equation being of the a form $C = f(C_0, C_1, \dots, C_N, V)$, said N being at least 1, said parameters C_0, C_1, \dots, C_N being subject to uncertainty, said characteristic C being distributed within a domain;

a probability density function (PDF) for describing ~~the~~ a probability of occurrence of C_0 in accordance with said uncertainty; and

subsidiary equations expressing C_1, \dots, C_N in terms of C_0 ;

said program code comprising code for determining the characteristic C using said model.

41. (Currently amended) The ~~model~~ computer readable medium of claim 40, ~~further comprising wherein the program code comprises~~ means for using the base equation, the PDF, and the subsidiary equations to calculate a value of C from input comprising a value V' of V.

42. (Currently amended) The ~~model~~ computer readable medium of claim 40, ~~further comprising wherein the program code comprises~~ means for using the base equation, the PDF, and the subsidiary equations to determine a performance characteristic of a design, said design comprising I nodes in the domain, said i being at least 2, each node i of the I nodes having a value C(i) of the characteristic C, said i having values of 1, 2, ..., I.

43. (Currently amended) The ~~model~~ computer readable medium of claim 40, said PDF being a normal probability distribution.

44. (Currently amended) The ~~model~~ computer readable medium of claim 40, said subsidiary equations having a form of $C_x = g_x(C_{x-1})$ for functions g_x , said functions g_x each being a linear or quadratic function of C_{x-1} , said x having values of 1, 2, ..., N.

45. (Currently amended) The ~~model~~ computer readable medium of claim 40, said domain being a physical domain, said characteristic C being spatially distributed within said physical domain.

46. (Currently amended) The ~~model~~ computer readable medium of claim 45, said characteristic C being an electrical characteristic.

47. (Currently amended) The ~~model~~ computer readable medium of claim 46, said characteristic C denoting capacitance at a node of the domain, said V denoting a voltage applied to the node.

48. (Currently amended) The ~~model~~ computer readable medium of claim 47, said function f being a polynomial in V of order N, said N being at least 5.

49. (Withdrawn) A model, comprising:

a combination equation that expresses C as a function F of the J subcharacteristics, said J being at least 2, said characteristic C being distributed within a domain, said characteristic C having J subcharacteristics S_1, S_2, \dots, S_J ;

base equations expressing S_j as a function f_j of a variable V through use of $N+1$ parameters $S_{j0}, S_{j1}, \dots, S_{jN}$, said base equations being of the form $S_j = f_j(S_{j0}, S_{j1}, \dots, S_{jN}, V)$, said N being at least 1, said parameters $S_{j0}, S_{j1}, \dots, S_{jN}$ being subject to uncertainty, said j having values of 1, 2, ..., J ;

at least one probability density function (PDF) from $PDF_1, PDF_2, \dots, PDF_J$, said PDF_n describing the probability of occurrence of S_{n0} in accordance with said uncertainty for $n=1, 2, \dots, J$, said at least one PDF including PDF_1 ;

for each PDF_n that does not exist: an auxiliary equation E_n expressing S_{n0} in terms of S_{10} ;
and

subsidiary equations expressing S_{j1}, \dots, S_{jN} in terms of S_{j0} for each subcharacteristic S_j of the J subcharacteristics.

50. (Withdrawn) The model of claim 49, further comprising means for using the combination equation, the base equations, the at least one PDF, each auxiliary equation, and the subsidiary equations to calculate a value of C from input comprising a value V' of V .

51. (Withdrawn) The model of claim 49, further comprising means for using the combination equation, the base equations, the at least one PDF, each auxiliary equation, and the subsidiary equations to determine a performance characteristic of a design, said design comprising I nodes

in the domain, said I being at least 2, each node i of the I nodes having the characteristic C comprising the J subcharacteristics S_1, S_2, \dots, S_J , said i having values of 1, 2, ..., I .

52. (Withdrawn) The model of claim 49, said f_j having a same functional form of V for each subcharacteristic S_j of the J subcharacteristics.

53. (Withdrawn) The model of claim 49, said f_j being constant with respect to any variation in V for each subcharacteristic S_j of the J subcharacteristics.

54. (Withdrawn) The model of claim 49, said f_j varying with respect to a variation in V for each subcharacteristic S_j of the J subcharacteristics.

55. (Withdrawn) The model of claim 49, said PDF_j being a normal probability distribution for at least one subcharacteristic S_j of the J subcharacteristics.

56. (Withdrawn) The model of claim 49, said domain being a physical domain, said characteristic C being spatially distributed within said physical domain.

57. (Withdrawn) The model of claim 56, said characteristic C being an electrical characteristic.

58. (Withdrawn) The model of claim 57, said characteristic C denoting capacitance at a node of the domain, said V denoting a voltage applied to the node.

59. (Withdrawn) The model of claim 58, said function f_j being a polynomial in V of order N for each subcharacteristic S_j of the J subcharacteristics, said N being at least 5.